PESTICIDE APPLICATION EQUIPMENT OWNED BY FARMERS

48 STATES

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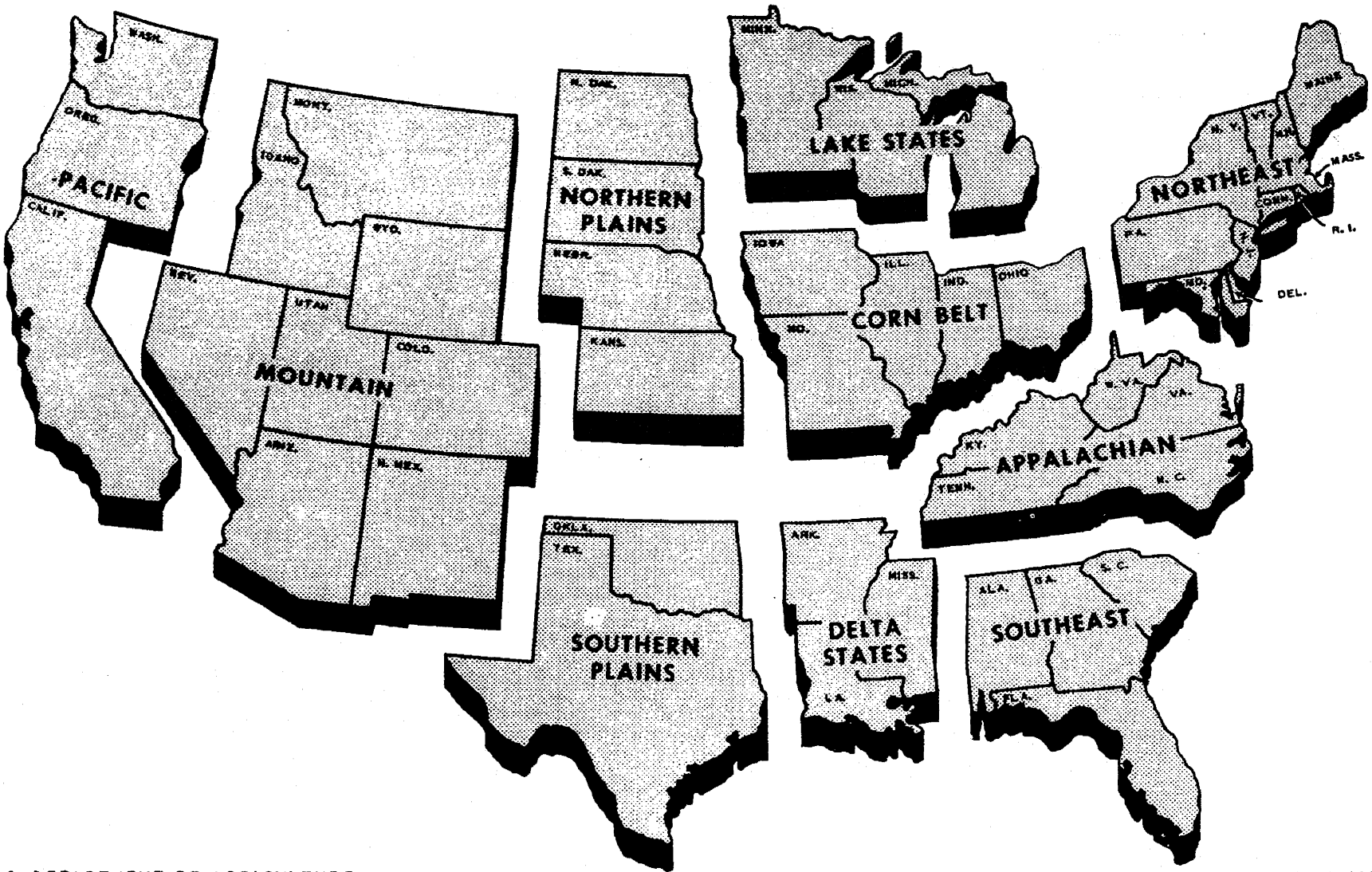
FARM PRODUCTION REGIONS



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PREFACE

This is one in a series of reports based on a nationwide sample survey of farmers conducted in 1965 to measure the extent of pesticide use by farmers during 1964. Personnel in the Statistical Reporting Service (SRS), Agricultural Research Service (ARS), and the Agricultural Stabilization and Conservation Service (ASCS) assisted in carrying out the study.

The earlier reports are Farmers Expenditures for Pesticides in 1964; Quantities of Pesticides Used by Farmers in 1964; Farmers' Pesticide Expenditures for Crops, Livestock, and Other Selected Uses in 1964; and Farmers' Expenditures for Custom Pesticide Services in 1964 (Agricultural Economic Reports 106, 131, 145, and 146, respectively).

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SUMMARY

Most farmers in the United States use pesticides on crops or livestock. In 1964, they applied three-fourths of these pesticides with their own equipment; one-fourth was applied by custom operators.

Farmers apply pesticides with three general types of equipment: (1) self-contained power-driven units, (2) attachments used with other field equipment, and (3) hand-operated and other application devices.

Nearly all of the power-driven units and attachments were designed for applying crop pesticides. Some were designed for applications to livestock or livestock premises.

Of the self-contained power-driven units, sprayers were the most prevalent. In 1964, slightly more than half of the farmers surveyed had power sprayers. Altogether, farmers owned an estimated 1 million power-driven sprayers.

Most of the power-driven spraying units, more than 80 percent, were operated by power take-off. About 15 percent were powered by auxiliary engines, and 4 percent were self-propelled.

Dusting equipment is becoming less significant. Only about 6 percent of the farmers surveyed owned power-driven dusters. For the United States, this amounted to about 112,000 units. One out of 10 farmers surveyed owned machine attachments for applying pesticides, an estimated total of about 172,000 for all farmers in the United States.

The majority of the farmers surveyed also had hand-operated or other nonpowered pesticide application equipment. In 1964, slightly over 2 million of these units were owned by farmers.

Owners of large farms had power-driven sprayers more often than owners of small farms--75 percent of those with sales of $40,000 and over a year, in contrast to 19 percent of those with sales of less than $5,000. However, owners of large farms had more sales per unit of power-driven pesticide equipment than owners of small farms.

Self-propelled sprayers were most heavily concentrated in the Delta States, where they were used primarily for cotton pest control. Power take-off driven units were most popular in the Corn Belt for use on corn and other grain crops. Auxiliary engine rigs were most common in the Lake States.

Of the equipment purchased new, 55 percent of the power-driven sprayers, 47 percent of the dusters, and 87 percent of the machine attachments were purchased within 5 years preceding the survey. Many used sprayers were also acquired in the same period. Dusters were somewhat older than sprayers. Less than 10 percent of the equipment purchased new was obtained before 1950.

On the average, new self-propelled sprayers bought between 1960 and 1964 cost nearly $2,400. Power take-off sprayers averaged about $250, power take-off dusters about $215, and machine attachments between $131 and $231.

PESTICIDE APPLICATION EQUIPMENT OWNED BY FARMERS, 48 STATES

by

Robert Jenkins, Theodore Eichers, Paul Andrilenas,
and Austin Fox, Agricultural Economists
Farm Production Economics Division

Pesticides are essential to modern agriculture for the effective control of pests and diseases that attack crops and livestock. In recent years, use of pesticides has increased significantly. Nearly every U.S. farmer now uses pesticides, and most own equipment needed to apply them.

Equipment for applying pesticides includes devices to dispense insecticides, herbicides, fungicides, miticides, nematocides, rodenticides, soil fumigants, defoliants, and desiccants. The first implements farmers used to apply pesticides were crude, inexpensive, hand-operated devices. Modern equipment is often more complicated and costly as well as more precise, versatile, and easy to handle. The larger units are power-driven.

This report discusses the amount, type, cost, and regional distribution of the ownership of pesticide application equipment used by farm operators in 1964. Emphasis is on power-driven sprayers and dusters, and on machine attachments. The report does not include data on equipment to dispense materials used only in home or garden, or disinfectants and medicines for livestock.

Findings in this report are based on the results of a 1965 survey of 10,800 farmers in 417 counties throughout the 48 contiguous States. The survey included farms with annual gross sales of $5,000 or more in all areas except the Appalachian, Southeast, and Delta States Regions (see map inside front cover). In these regions, it included farms with gross sales of $2,500 or more per year. The sample was designed to be representative of similar-size farms. However, the data were expanded to regional and 48 State totals for all farmers, including those not represented by the survey.

Although the data in this report are several years old, they should be helpful to policymakers, representatives of industry, educators, and researchers in evaluating the impact of pesticide application equipment on pest control programs, and on the production, marketing, and utilization of pesticides.

In this report, data are included only for application devices that were owned and used by farmers in 1964. Application rigs purchased earlier and subsequently sold or discarded are not included.

SELECTION OF PESTICIDE EQUIPMENT

Farmers use several kinds of equipment to apply pesticides. The diversity of spraying and dusting equipment used is associated with the need for equipment of various capabilities. Sprayers and dusters are "lumpy" (not capable of being divided into small units for use) inputs rather than divisible inputs such as feed and fertilizer. It is not possible for a farmer to have a part of a sprayer or duster (unless it is owned jointly), even if economic information indicates fractional parts would be most profitable. For example, on a small farm one sprayer may be required for treating less than 10 acres. The same sprayer, without any additional machinery investment, could be used to treat 100 acres or more on a large farm.

One method by which farmers can overcome the problem of "lumpiness" is to use equipment of different capabilities. From an economic standpoint, the transition from low-cost simple equipment to high-cost sophisticated equipment is like using more units of a continuous type of input. For example, operators of small farms may find a power take-off driven sprayer most profitable while operators of larger farms may sometimes profitably use a self-propelled sprayer.

For the farmer who uses only a small amount of pesticides, custom application may be most profitable. If larger quantities of pesticides are needed, used equipment or equipment capable only of applying small quantities may be economically justified. On progressively larger operations, more expensive and complex sprayers and dusters would probably be justified. Factors such as convenience, dependability, and speed of application, as well as the availability of skilled operators, may also influence the farmer to buy newer and more complex machines or to hire custom applicators.

FARM OWNERSHIP OF ALL TYPES OF PESTICIDE APPLICATION EQUIPMENT

In 1964, farmers owned an estimated 3.5 million pieces of pesticide application equipment, including power-driven, hand-operated, and other devices as shown in the following tabulation:

Kind of pesticide application unit	Number of units	
	1951 1/	1964 2/
	1,000	1,000
Power-driven machines:		
Sprayers	407	1,016
Dusters	110	112
Machine attachments	3/	172
Hand-operated and other application units	3/	2,248
Total	3/	3,548

1/ Brodell, Albert P., Paul E. Strickler, and Paul P. Wallrabenstein, Farm Power and Farm Machines, USDA, FM 101, Feb. 1953. Estimates for beginning of the year.

2/ Estimates for end of the year based on 1964 Pesticide Uses Survey.

3/ Data not available.

Ownership averaged more than one unit for each farmer in the United States. About one-third of it (approximately a million units) was power-driven equipment; the other two-thirds (about 2.2 million units) was hand-operated and other units such as knapsack sprayers, hand sprayers and dusters, dipping vats, and livestock rubbers. From 1951 to 1964, the number of power-driven sprayers more than doubled while dusters remained about the same. This may reflect an increasing preference for sprays rather than dusts, as well as changes in types of farms using pesticides. Additional detail on changes in ownership of pesticide equipment is shown in appendix tables 1 and 2.

POWER-DRIVEN PESTICIDE APPLICATION EQUIPMENT

In 1964, farmers owned more than 1 million units of power-driven pesticide application equipment (table 1, page 8). This represented more than one unit for every three farmers in the United States. The power-driven equipment they owned consisted of sprayers, dusters, and various machine attachments which can be used for applying sprays, dusts, granules, or other forms of pesticides.

Self-propelled units may vary from pumps and tanks mounted on a truck chassis to highly specialized units designed for specific types of spraying operations. Auxiliary engine and power take-off application units also can vary considerably in size and complexity.

Pesticide application attachments for other farm machines will not function as completely independent units. They may be power driven or ground driven. These attachments normally consist of pumps, tanks, booms, hoses, nozzles, and other miscellaneous devices that attach to and form part of other equipment such as corn planters, seeders, fertilizer applicators, etc. Attachments enable the farmer to apply pesticides in conjunction with other field operations.

Fifty-four percent of the farmers included in the survey owned one or more power-driven sprayers. Ten percent owned machine attachments, and 6 percent had power-driven dusters (table 1).

Farmers in the Corn Belt owned the largest number of power sprayers and machine attachments. Power dusters were reported most often by farmers in the Southeast and the Appalachian Regions.

Throughout the 48 States, operators of large farms owned proportionally more power-driven sprayers and machine attachments than operators of small farms (table 2).

Operators of large farms (marketings of $40,000 or more) also utilized application equipment more efficiently than those of small farms. They used one sprayer for every $100,000 worth of agricultural products produced while operators of small farms (marketings of $5,000 to $9,999) used six. Dusters were more numerous among farmers with low incomes than for farmers with high incomes.

Sprayers

Sprayers accounted for about 90 percent of all power-driven application machines on farms in 1964. Farm operators reported over 1 million power sprayers at that time. These sprayers were either self-propelled, auxiliary engine, or power take-off units.

Farmers in the Corn Belt owned 283,000 power sprayers, the largest number owned by farmers in any region and over one-fourth of the total number on farms. Relatively few power sprayers were owned by farmers in the southern and western areas (table 1).

The largest number of power sprayers was owned by farmers whose annual gross sales were between $10,000 and $19,999; farmers whose sales were $40,000 or more a year owned the smallest number (table 2). On the other hand, 75 percent of the operators of large farms owned power sprayers, compared with 19 percent of the small-farm operations.

Over 80 percent of all power sprayers on farms in 1964, 832,000, were power take-off models (table 3). These models were popular because of their comparatively low cost and ease of maintenance. Fifteen percent of the sprayers, 145,000, were auxiliary engine units, and less than 5 percent, only 39,000, were self-propelled machines.

Farmers in the Corn Belt, where a large share of the corn and other grains are grown, owned the largest number of power take-off sprayers--264,000. Farmers in the Lake States, where fruit and vegetable acreages are large, owned the largest number of sprayers with auxiliary engines. Self-propelled sprayers were reported most often by farmers in the Delta States, where large acreages of cotton required repeated applications of pesticides.

A large number of the self-propelled sprayers were used on large farms. Farmers whose annual gross sales were $40,000 or more reported owning 14,000 of the 39,000 on farms in 1964 (table 4). Power take-off and auxiliary engine spray units were reported most often by farmers whose gross sales were between $10,000 and $19,999. Farmers whose sales were under $10,000 a year were less likely to own power sprayers than farmers with larger operations.

Dusters

In 1964, farmers owned an estimated 112,000 power dusters. Nearly all of these--98,000--were power take-off machines (table 3). Auxiliary engines powered 12,000 dusting units, and 2,000 were self-propelled units. Since the use of pesticides in the form of dust has decreased, it is not surprising that only 6 percent of the farmers owned power dusters and that dusters accounted for less than 10 percent of all power-driven pesticide application equipment.

A large share of the power dusters were owned by farmers in the Southeast and Appalachian Regions, where they were used mostly in tobacco, peanut, and cotton pest control operations. No region had more than 2,000 dusters with auxiliary engines, and, except for the Delta and Pacific Regions, all areas had less than 1,000 self-propelled dusters.

Dusters seemed to be relatively more numerous on small farms. Table 4 shows that the number of dusters owned by farmers whose annual gross sales were less than $5,000 was considerably larger than the number of dusters owned by farmers with larger operations.

Attachments

Machine attachments were popular because of their convenience and low cost and because they enabled farmers to apply pesticides at the same time they were performing other field operations. Thus, use of machine attachments minimizes labor required in crop production and reduces soil compaction which would result from repeated traffic through fields. Pesticide attachments are most commonly used with seeding and cultivating equipment.

Farmers had about 172,000 attachments in 1964 (table 1). Over half belonged to farmers in the Corn Belt, where they were used primarily for applying pesticides to corn, soybeans, and related field crops. The second largest number belonged to farmers in the Northern Plains Region. Attachments were not used extensively by farmers in most other regions.

Machine attachments, like sprayers, were reported by a higher percentage of farmers with large operations than by those with small operations.

Sixty-seven percent of all machine attachments, 116,000, were designed for applying granular pesticides, mainly to corn and soybeans (table 5). Of the remaining number, 44,000 were designed for applying sprays. Attachments for applying granules and sprays were most evident in the Corn Belt. The few dusting attachments reported were owned mainly by farmers in the Northern Plains and Appalachian Regions.

Farmers with annual gross sales of between $10,000 and $19,999 owned about the same number of spraying and dusting attachments as those whose gross sales averaged $40,000 or more a year. Attachments for applying granular pesticides were owned mostly by farmers whose annual gross sales totaled $10,000 or more (table 6).

Purchases of Application Equipment

Seventy-eight percent of the power-driven sprayers, 75 percent of the power-driven dusters, and 87 percent of the attachments on farms in 1964 were purchased new (table 7). One reason why much of the pesticide equipment is commonly purchased new is that many pesticides are very corrosive and quickly damage the equipment if it is not properly maintained. It is often hard to determine the degree of maintenance given a second hand machine.

Among the regions, the proportion of power sprayers that had been purchased new ranged from 67 percent in the Pacific Region to 89 percent in the Southeast. On the average, the proportion of power dusters purchased new in each region was slightly lower than the proportion of power sprayers purchased new. The percentage range was from 44 percent in the Northeast to 82 percent in the Northern Plains. Nearly all of the machine attachments were purchased new. The proportion purchased new ranged from 68 percent in the Pacific Region to 97 percent in the Southeast.

Operators of large farms purchased only slightly more new equipment than operators of small farms (table 8). Seventy-eight percent of the sprayers on small farms and 81 percent of those on

large farms were purchased new. Of all dusters on small farms and on large farms, 71 percent and 83 percent, respectively, were purchased new. Of all machine attachments, 86 percent on small farms and 90 percent on large farms were purchased new.

More than one-half of the pesticide application equipment was acquired during 1960-64. Fifty-five percent of the power sprayers that had been purchased new and 60 percent of those purchased used were acquired within this 5-year period (table 9). During this period, 47 percent of all dusters purchased new and 87 percent of all machine attachments purchased new were acquired. Fifty-nine percent of the used dusters and 83 percent of the used attachments were also acquired in the 1960-64 period.

Only 5 percent of the sprayers which had been bought new and were still on farms in 1964 were purchased before 1950. Ten percent of the dusters that had been purchased new were also obtained in the earlier time periods.

Cost of Application Equipment

The cost of pesticide application equipment is determined by its size, complexity, and type; the competitive position of buyer and seller; and the general price situation. The average cost of a new self-propelled sprayer was nearly $2,400 during 1960-64 (table 10). The cost of power take-off sprayers averaged about $250 and that of power take-off dusters about $215. Attachments cost an average of $131 to $231, depending on the type of unit.

Self-propelled sprayers cost about 10 times as much as power take-off units and about 3 times as much as auxiliary engine units. Average prices for power take-off and auxiliary engine sprayers did not increase between 1950 and 1964, but the cost of self-propelled units went up appreciably. Many power take-off sprayers and auxiliary engine units may have been simplified, which would reduce costs. Self-propelled models, on the other hand, often have become larger and more sophisticated, pushing up costs.

On the average, dusters cost considerably less than sprayers because they are not as complicated. Sprayers usually include devices such as agitators, pumps, and tanks to handle and move water. Although dusters are cheaper, farmers prefer sprayers because they are more versatile and spray materials are generally available.

Most attachments cost considerably less, are more convenient, and generally require less labor than self-contained sprayers and dusters. These factors largely account for the recent increase in purchases of attachments.

HAND-OPERATED AND OTHER PESTICIDE APPLICATION EQUIPMENT

Farmers usually own some type of hand-operated and other non-power pesticide application equipment. This includes hand sprayers and dusters, knapsack sprayers, livestock rubbing devices, and dipping vats. In 1964, farmers had an estimated 1,091,000 hand sprayers, 343,000 knapsack sprayers, 520,000 livestock rubbers, 279,000 hand dusters, and 15,000 dipping vats (table 11).

The largest numbers of hand-operated spray units and livestock rubbers were reported by farmers in the Corn Belt, and the smallest by farmers in the Pacific Region.

Hand-operated or other nonpower equipment may be adequate for some farmers, depending on the type of crop or livestock to be treated and the extent to which pesticides will be used. For instance, when small amounts of pesticides are applied daily, as to a dairy herd, a hand sprayer may be the most efficient means. Similarly, a hand-operated duster, rather than a power duster, may be chosen by some farmers with very small acreages.

Table 1.--Percentage of farmers reporting ownership of power-driven pesticide application machines and machine attachments and number of units on farms, by farm production regions, United States, 1964 1/

Region	Percentage of farmers reporting ownership of--2/			Number of--3/		
	Sprayers	Dusters	Machine attachments	Sprayers	Dusters	Machine attachments
	Percent			Thousands		
Northeast	51	3	4	71	4	5
Lake States	48	1	4	134	3	10
Corn Belt	66	1	22	283	5	93
Northern Plains	61	1	13	125	1	29
Appalachian	59	28	2	117	23	6
Southeast	40	32	6	59	42	8
Delta States	41	9	8	49	9	10
Southern Plains	58	10	2	76	11	3
Mountain	59	3	3	51	3	3
Pacific	52	13	5	51	11	5
All regions	54	6	10	1,016	112	172

1/ Excludes Alaska and Hawaii.
2/ Farmers reporting equipment as a percentage of all farmers surveyed.
3/ Estimated number of units. Includes factory-assembled as well as farmer-designed equipment.

Table 2.--Percentage of farmers reporting ownership of power-driven pesticide application machines and machine attachments and number of units on farms, by annual gross sales categories, United States, 1964 1/

Annual gross sales	Percentage of farmers reporting ownership of--2/			Number of--3/		
	Sprayers	Dusters	Machine attachments	Sprayers	Dusters	Machine attachments
	Percent			Thousands		
Less than $5,000	19	10	2	178	32	28
$5,000-$9,999	42	5	4	218	27	19
$10,000-$19,999	57	4	9	283	22	43
$20,000-$39,999	70	6	16	199	15	42
$40,000 and over	75	9	23	138	16	40
All sales groups	54	6	10	1,016	112	172

1/ Excludes Alaska and Hawaii.
2/ Farmers reporting equipment as a percentage of all farmers surveyed.
3/ Estimated number of units. Includes factory-assembled as well as farmer-designed equipment.

Table 3.--Number of power-driven sprayers and dusters on farms, by type of unit, and by farm production regions, United States, 1964 1/

Region	Sprayers			Dusters		
	Self-propelled	Power take-off	Auxiliary engine	Self-propelled	Power take-off	Auxiliary engine
	Thousands					
Northeast	1	58	12	2/	2	2
Lake States	3	101	30	2/	1	2
Corn Belt	5	264	14	2/	3	2
Northern Plains	2	109	14	--	1	2/
Appalachian	5	104	8	2/	22	1
Southeast	4	52	3	1	40	1
Delta States	8	38	3	--	8	1
Southern Plains	3	50	23	2/	11	2/
Mountain	3	32	16	--	2	1
Pacific	5	24	22	1	8	2
All regions	39	832	145	2	98	12

1/ Estimated number of units. Includes factory-assembled as well as farmer-designed equipment. Excludes Alaska and Hawaii.

2/ Less than 500 units.

Table 4.--Number of power-driven sprayers and dusters on farms, by type of unit and by annual gross sales of farmers, United States, 1964 1/

Annual gross sales	Sprayers			Dusters		
	Self-propelled	Power take-off	Auxiliary engine	Self-propelled	Power take-off	Auxiliary engine
	Thousands					
Less than $5,000	7	148	23	1	29	2
$5,000-$9,999	4	188	26	2/	24	3
$10,000-$19,999	5	240	38	1	18	3
$20,000-$39,999	9	162	28	2/	14	1
$40,000 and over	14	94	30	2/	13	3
All sales groups	39	832	145	2	98	12

1/ Estimated number of units. Includes factory-assembled as well as farmer-designed equipment. Excludes Alaska and Hawaii.

2/ Less than 500 units.

Table 5.--Number of farmer-owned machine attachments for applying different types of pesticide materials, by farm production regions, United States, 1964 1/

Region	Machine attachments for applying--			
	Sprays	Dusts	Granular materials	Other materials
	Thousands			
Northeast	5	--	2/	--
Lake States	3	2/	6	2/
Corn Belt	14	2/	78	2/
Northern Plains	2	1	25	1
Appalachian	1	1	4	2/
Southeast	6	2/	1	2/
Delta States	6	--	2/	4
Southern Plains	2	2/	2/	1
Mountain	1	--	1	1
Pacific	4	--	2/	1
All regions	44	3	116	9

1/ Estimated number of units. Includes factory-assembled as well as farmer-designed equipment. Excludes Alaska and Hawaii.
2/ Less than 500 units.

Table 6.--Number of machine attachments for applying different types of pesticide materials owned by farmers with specified annual gross sales, United States, 1964 1/

Annual gross sales	Machine attachments for dispensing--			
	Sprays	Dusts	Granular materials	Other materials
	Thousands			
Less than $5,000	8	1	18	1
$5,000-$9,999	8	2/	10	1
$10,000-$19,999	10	1	31	1
$20,000-$39,999	8	2/	31	3
$40,000 and over	10	1	26	3
All sales groups	44	3	116	9

1/ Estimated number of units. Includes factory-assembled as well as farmer-designed equipment. Excludes Alaska and Hawaii.
2/ Less than 500 units.

Table 7.--Percentage of power-driven sprayers, dusters, and machine attachments purchased new, by farm production regions, United States, 1964 1/

Region	Sprayers	Dusters	Machine attachments
	Percent		
Northeast	71	44	96
Lake States	79	68	93
Corn Belt	76	78	87
Northern Plains	75	82	82
Appalachian	88	74	91
Southeast	89	80	97
Delta States	83	73	92
Southern Plains	81	81	92
Mountain	74	64	86
Pacific	67	68	68
All regions	78	75	87

1/ Excludes Alaska and Hawaii.

Table 8.--Percentage of power-driven sprayers, dusters, and machine attachments purchased new by farmers with specified annual gross sales, United States, 1964 1/

Gross sales per farm	Sprayers	Dusters	Machine attachments
	Percent		
Less than $5,000	78	71	86
$5,000-$9,999	75	75	82
$10,000-$19,999	79	76	86
$20,000-$39,999	78	74	87
$40,000 and over	81	83	90
All sales groups	78	75	87

1/ Excludes Alaska and Hawaii.

Table 8.--Percentage of power-driven pesticide application equipment on farms, purchased new and used, by type and period in which purchased, United States, 1964 1/

Type of equipment	Equipment purchased new--				Equipment purchased used--				Total number of units purchased--2/	
	Before 1950	1950-54	1955-59	1960-64	Before 1950	1950-54	1955-59	1960-64	New	Used
	Percent								Thousands	
Sprayers:										
Self-propelled	2	11	20	67	2	1	29	68	26	13
Power take-off	4	12	29	55	4	9	27	60	661	171
Auxiliary engine	7	14	23	56	8	11	27	54	107	38
All sprayers	5	12	28	55	4	9	27	60	794	222
Dusters:										
Self-propelled	11	33	3/	56	3/	18	3/	82	2	4/
Power take-off	7	17	28	48	5	11	27	57	74	24
Auxiliary engine	38	16	17	29	15	11	11	63	8	4
All dusters	10	17	26	47	6	11	24	59	84	28
Machine attachments:										
Spray	3/	5	14	81	3	3	31	63	39	5
Dust	3/	3/	36	64	3/	3/	26	74	2	1
Granular	1	3/	8	91	3/	1	9	90	100	16
Other	3/	4	13	83	3/	3/	3/	3/	9	4/
All attachments	1	2	10	87	1	1	15	83	150	22

1/ Excludes Alaska and Hawaii.
2/ Estimated number of units. Includes factory-assembled as well as farmer-designed equipment.
3/ Less than 0.5 percent.
4/ Less than 1,000 units.

Table 10.--Average cost of power-driven pesticide application equipment on farms, purchased new during different time periods, United States, 1964 1/

Type of equipment	Average cost of units purchased new--			
	Before 1950	1950-54	1955-59	1960-64
	Dollars			
Sprayers:				
Self-propelled	1,081	1,036	1,737	2,386
Power take-off	334	218	236	252
Auxiliary engine	725	839	1,159	789
Dusters:				
Self-propelled	100	190	---	411
Power take-off	196	218	268	214
Auxiliary engine	637	470	278	175
Machine attachments:				
Spray	400	438	143	169
Dust	---	---	104	195
Granular	108	200	117	131
Other	---	112	165	231

1/ Excludes Alaska and Hawaii.

Table 11.--Number of nonpower pesticide application units owned by farmers, by farm production regions, United States, 1964 1/

Region	Nonpower sprayers		Hand dusters	Dipping vats	Livestock rubbers
	Knapsack 2/	Hand 3/			
	Thousands				
Northeast	26	67	23	4/	4
Lake States	166	248	40	3	162
Corn Belt	44	231	32	2	31
Northern Plains	33	140	13	1	152
Appalachian	30	200	82	1	33
Southeast	3	34	39	4/	14
Delta States	7	46	19	1	32
Southern Plains	17	56	12	4	37
Mountain	12	40	7	1	52
Pacific	5	29	12	2	3
All regions	343	1,091	279	15	520

1/ Estimated number of units. Includes all application equipment that is not mechanically powered. Excluded Alaska and Hawaii.
2/ Has compressed air reservoir.
3/ Does not have compressed air reservoir.
4/ Less than 500 units.

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Appendix table 1.--Number of power-driven sprayers and dusters on farms, by farm production regions, United States, 1951, 1956, 1964 1/

Region	Number of sprayers			Number of dusters		
	1951 2/	1956 3/	1964 4/	1951 2/	1956 3/	1964 4/
	Thousands					
Northeast	48	62	71	14	12	4
Lake States	53	88	134	4	5	3
Corn Belt	104	215	283	3	5	5
Northern Plains	53	100	125	2	3	1
Appalachian	19	40	117	8	12	23
Southeast	13	19	59	26	43	42
Delta States	12	21	49	13	19	9
Southern Plains	26	55	76	16	20	11
Mountain	27	39	51	6	8	3
Pacific	52	61	51	18	23	11
48 States	407	800	1,016	110	150	112

1/ Excludes Alaska and Hawaii.

2/ Farm Power and Farm Machines, USDA, FM 101, Feb. 1953. Estimates for beginning of the year.

3/ Farm Machinery - A Survey of Ownership and Custom Work, USDA, Statis. Bul. No. 279, Mar. 1961, and Farm Machines and Equipment - A Preliminary Report, July 1958. Estimates for end of the year.

4/ Results from Pesticide Uses Survey included in this publication. Estimates for end of the year.

Appendix table 2.--Average number of power-driven sprayers and dusters shipped annually by manufacturers for domestic use, by selected time periods, United States

Time period	Average annual shipments	
	Sprayers 1/	Dusters 2/
	1,000 units	
1940-44	8	7
1945-49	51	14
1950-54	93	23
1955-59	103	10
1960-64	84	4
1965-66	3/84	4/

1/ Excludes Alaska and Hawaii.

2/ Includes power-driven spray pumps, which could be used as components of pesticide attachments.

3/ Includes power take-off, engine-driven, and tractor-driven units. Some may have been good as attachments.

4/ Includes 54,000 sprayers and an estimated 30,000 power-driven spray pumps. Spray pumps were not available for 1965 and 1966.

5/ Data not available

Source: Strickler, Paul E., and Smith, Helen V., Farm Machinery and Equipment, U.S. Dept. Agr., Statis. Bul. 419, Mar. 1968.

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This publication reports research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife -- if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.

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